UNCLASSIFIED

AD NUMBER

AD223923

NEW LIMITATION CHANGE

TO

Approved for public release, distribution
unlimited

FROM

Distribution authorized to U.S. Gov't.
agencies and their contractors;
Administrative/Operational use; Feb 1956.
Other requests shall be referred to
Officce Of Naval Research, Arlington VA
22217-0000.

AUTHORITY

ONR notice 7 Aug 1970.

THIS PAGE IS UNCLASSIFIED

UNCLASSIFIED

AD 223923

DEFENSE DOCUMENTATION CENTER

FOR

SCIENTIFIC AND TECHNICAL INFORMATION

CAMERON STATION ALEXANDRIA, VIRGINIA

Best Available Copy

UNCLASSIFIED

CARNEGIE INSTITUTE OF TECHNOLOGY

PSYCHOLOGICAL LABORATORIES
PITTSBURGH 13, PENNSYLVANIA

CONDITIONS AFFECTING
THE MILITARY UTILIZATION OF PEER RATINGS:

THE NEWPORT STUDY

II. VALIDITY AGAINST IN-TRAINING CRITERIA

E. P. Hollander
Principal Investigator

Carnegie Institute of Technology
Psychological Laboratories
Pittsburgh 13, Pennsylvania

CONDITIONS AFFECTING THE MILITARY UTILIZATION OF PEER RATINGS:

THE NEWPORT STUDY.

II.   VALIDITY AGAINST IN-TRAINING CRITERIA

E. P. Hollander
Principal Investigator

Acknowledgment

No research project conducted in the field may achieve
any measure of success without the day-to-day cooperation
of the personnel associated with the field activity itself.
We were fortunate, indeed, to have such cooperation at
Newport. To adequately catalogue the names of all those
individuals to whom we are indebted to their support of this
project would be no small feat.

It must suffice, therefore, for us to express our
sincere sense of gratitude to the following individuals who
exemplified the splendid tone of cooperation and good
fellowship we found at the Officer Candidate School: Captain
W. B. Perkins, USN, Commanding Officer of the Naval Schools
Command and Officer-in-Charge of the OCS; Commander A. W.
Venne, Jr., USN, Assistant Officer-in-Charge; Commander
David Bryan, USN, Military Director; Lieutenant Commander
John C. Powell, USN, Second Battalion Officer; and Chief
Joseph F. Gleba, MAC, USN, of the Machine Record Office.

Finally, it would not do to conclude this expression of
thanks without a nod to the student personnel of OCS Class 23
for their extraordinary fortitude in the face of a periodic
onslaught of psychological devices.

Summary

From research completed with 23 trainee sections at the Naval OCS in Newport, data are presented regarding the in-training validity of peer nominations, as it is affected by three variables: the period of time the group has spent together; the nature of the set given, i.e., "for research purposes" or "for administrative purposes"; and, the quality or characteristic to be evaluated by the nominator in making his nominations. The criteria utilized were: pass-fail, final academic average, and final military aptitude grade. The following major findings are reported:

    1. Depending upon the criterion utilized, different forms yield differential validity in prediction.

    2. All forms show a tendency to increase in their correlation with academic performance from stage to stage.

    3. Irrespective of the stage at which administered, all forms show a generalized significance in the prediction of the military aptitude grade assigned by superiors.

    4. The form which best predicts the pass-fail and academic criteria is the one requiring nominations on "probability of success in OCS"; the significance of this prediction is found at every stage of administration and for both sets.

    5. While different forms show significant differences in validity against various criteria, there is no general disparity between the validity of forms administered under the "research" as against the "administrative" set, although certain interactions are found.

In keeping with the data on reliability reported earlier, it is concluded here that--depending upon the purpose for which intended--an early peer nomination will yield an adequate approximation to the prediction obtained from later ratings. This is of particular importance in light of the marked tendency for certain forms to be progressively loaded with an academic performance factor. The full practical implications of these findings must be tempered until validities are established against a post-training criterion emphasizing field performance characteristics.

I. Introduction

This is the second of a series of reports to deal with a large-scale study of peer ratings completed at the U. S. Naval School, Officer Candidate (OCS) in Newport, Rhode Island, during the summer and fall of 1955.

As has been noted in the preceding report (3), this study represented an expansion, rather than a replication, of the earlier work in this sphere done at Newport by the American Institute for Research under Navy Contract Nonr 890(01). While the area of concern of the current project was somewhat more circumscribed than that of the previous project, we are appreciative of the basic data available to us from the work this group had already completed.

In simplest practical terms, the project was conceived to eventually provide more information regarding the application of peer ratings--specifically, "peer nominations"--as a supplemental screening device in the OCS. Although this issue will be touched upon here, the final project report will serve as the vehicle for a more comprehensive delineation of the relevant implications along this line.

The research objectives of this study, basically, were to determine the reliability and validity of peer ratings under various instructional sets and time exposures. In the first report (3), the reliability of these measures was considered. Now we turn attention to the data available with regard to the validity of the peer rating forms in predicting in-training criteria. Certain of the answers regarding more ultimate validity must necessarily await the establishment of post-training criteria.

II. Background of the Problem

In practice, the so-called peer rating involves each group member's evaluation of his peers on some recognizable quality or set of characteristics which are manifested directly, or inferrable indirectly, from day-to-day, personal interactions. Such individual evaluations are then integrated into a composite score reflecting each person's standing in his group. The advantage of this technique appears to rest in its ability to yield unique supplementary data drawn from intimate contact among the personnel involved.

Peer rating procedures have already demonstrated a relatively high order of predictability against various performance criteria, with a substantial number of military groups (e.g., 4, 6, 7, 8, 11, 12, 13, 14, 15). It may be noted, too, that the greatest development of the peer ratings has taken place within the military services (2). Several questions remain to be answered, however, before optimum utilization of peer ratings may be effected.

III. Statement of the Problem

Three core problems may be specified for consideration at this stage. These involve, first, the length of time which the group must have spent together before peer ratings will approximate maximized validity and reliability; second, the presence of any differential effects on validity and reliability accruing from the use of peer ratings with a "research" set as against those with a "real" set; and, finally, the variations in validity and reliability which may be attributable to the nature of the quality on which the rater is instructed to rate the ratee. As has been suggested, this report will confine itself to data bearing on the in-training validity aspect of these problems.

IV. Subjects and Setting

Through the joint cooperation of the Office of Naval Research, the Bureau of Naval Personnel, and the Naval OCS itself, the entire input of OCS Class 23 was made available for this study. The sample entered training in July of 1955 and consisted of 23 sections numbering about 30 men each; there is no reason to suppose that assignment to these sections was on anything other than a random basis. The total N available for study exceeded 700, at the beginning of this project.

The program at the OCS is of sixteen weeks' duration, with an orientation week introduced before the actual onset of the training cycle. During this one-week period, student personnel are assigned to sections, receive books and clothing, take classification tests, receive orientation lectures, but do not attend formal classes, as such.

Except for a small minority drawn from the fleet--in this class numbering fewer than 5%--all of the students are graduates of four year college programs. The mean age of this class is 22 years with only a minimal dispersion above this figure.

Students at the OCS are selected according to rigorous mental and physical standards. All are volunteers, and must agree to remain on active duty as officers for three years following the successful conclusion of training.

V. Instruments.

The previous work of Suci, Vallance, and Glickman (9) established several points which bore upon the selection of instruments for this study. Their research indicates that ". . . ratings by peers based on either the behavior at OCS or projected, future behavior are equally reliable . . ." (9, p. 11); in addition, they report that, "The technique which requires selection of the upper and lower segments appears to have as satisfactory

reliability as any of the other tested techniques . . ." (9, p. 11); finally, they note that the order of presentation which yields the lowest correlation between forms is "future officer" followed by "OCS behavior" (9, p. 12). The pertinence of these findings to the issue of reliability has already been noted in the first report in this series (3, p. 8).

Four key sociometric forms of the peer nomination variety were utilized. Based upon the research cited above (9), a primary form calling for nominations on "success as a future Naval Officer" (FO) was administered to all sections. This form was seen to be of particular worth in its likely prediction of more distant, fleet performance criteria. In addition to this primary form, each section received one of three so-called secondary forms, i.e., "leadership qualities" (LQ), "interest in and enthusiasm for the Naval Service" (IE), and "probability of success in OCS" (OC). The selection of these forms rested upon a need to tap those characteristics which might relate to both in-training and post-training performance—i.e., interpersonal qualities, motivation, and ability having evident relevance to OCS performance.

Cutting across this pattern, approximately half the sections received a "research" set with the explicit point, appearing on their peer nomination forms, that "The results of these ratings are to be used for research purposes only and will not affect your Navy career." The other sections were given equally explicit instructions that "The results of these ratings may be used for administrative purposes." This split in treatment was designed to provide data on the differential reliability and validity resulting from administration under a "research" set as against an "administrative" set.

In all there were eight possible forms, i.e., four characteristics to be rated times two sets. In appendix A, form FO-RO is reproduced as an illustration of the format followed with all forms. Since this was varied only slightly to accommodate alternative instructions, the reader may view this as an example of the general instructions applied.

As will be noted, all of the forms required five "high" and five "low" nominations in order of preference. Each of the subjects was provided with a complete alphabetical roster of his sectionmates every time he was required to complete a form. The principal investigator was the sole administrator of the forms for all sections at all times.

VI. Study Design

The ultimate design of the study is reflected in Table 1. It will be seen that the 23 sections were divided into six blocks of four sections each, except for one block which, of necessity, was limited to three sections. Sections were assigned to blocks on a rotation basis from the five companies in the second battalion which comprised the class, i.e., How, Jig, King, Love, Mike. Such differences as might exist between companies were thus restricted in their conceivable ability to contaminate the study design.

Once having been assigned to a given block, the treatment of any given section was identical through training. Three major administrations of these forms was carried on during the training cycle: the first occurred during the so-called "orientation week"--referred to hereafter as the "0" week--after the subjects had been together in their respective sections for four to five days; at the end of the third week of training ("3" week); and, at the end of the sixth week of training ("6" week). The design appearing in Table I was replicated,

TABLE I

Study Design* Indicating
Forms Used and Sections to Which Applied

Section Allocation

Forms**	Set	
	Research (RO)	Administrative (AU)
"Future Officer" (FO) "Interest & Enthusiasm" (IE)	H-1, J-1, L-1, M-1 A/	H-2, K-1, L-2, M-2 B/
"Future Officer" (FO) "Success in OCS" (OC)	H-3, H-4, J-4, K-4 C/	H-5, J-5, K-5 D/
"Future Officer" (FO) "Leadership Qualities" (LQ)	J-2, K-2, L-3, M-3 E/	J-3, K-3, L-4, M-4 F/

*This design was applied at the end of the orientation
week, third week, sixth week, and—except for the
omission of the secondary forms—the thirteenth week.

**Note that each section received two forms.

/Signifies group code designation.

therefore, a total of three times. At the end of the thirteenth week

of training, another administration of forms was made, but this last

time only the primary, "future officer," form was used. In all other

respects, the design was identical for the latter administration.

VII. Scoring

Following the pattern utilized in several studies elsewhere (e.g., 4, 11),

a direct weighting procedure was applied to derive peer nomination scores.

The highest nominee was awarded a plus 5, the next highest, a plus 4,

and so on through the five "highs"; similarly, the lowest nominee was

assigned a minus 5, the next lowest, a minus 4, and so on. An algebraic

sum was then obtained for each subject and divided by the N of the group

minus 1, since no subject may nominate himself. This results in an

average score ranging on a continuum from plus five to minus five. To

remove the minus sign, a constant of 5 was added to this score; the

resultant value was then multiplied by 10 in order to permit the use of

a two digit score without the intervening decimal point. Where a subject

had an average raw value of minus 5, and hence a score of 00, he was

arbitrarily given a score of 01, after the constant had been added and

the multiplication had taken place. At the other end of the range, the

plus 5 subject was given a score of 99, rather than 100.

The distribution arising from this procedure has normal charac-

teristics with a range from 1 to 99, a mean of 50, and a standard

deviation approximating 10, for the total population of the study.

While this score may be seen to have certain features of a standard

score, it does not tend to obscure section differences so much as does

the standard score. Furthermore, this score does not presume the

homogeneity of characteristics from section to section which is assumed

under a generalized standard score transformation.

VIII. Reliability of Measures

In determining the reliability of peer nomination data, two major approaches may be followed: first, calculation of internal consistency through correlation of scores obtained by an odd-even split of raters corrected by the Spearman-Brown formula; second, calculation of consistency over time through repeat administration. The previous report in this series (3) covers the reliability obtained for all forms, under both sets, at various time levels, using both the single-stage and longitudinal approaches.

Table II reports the corrected split-half reliability coefficients yielded from the eight peer nomination forms utilized, at various points in the life cycle of relevant groups. It will be seen that the reliabilities in the first column, for all forms, approximate .90--even though the sections had been comprised only four or five days before. The gain, as regards higher reliabilities, is greater, but not significantly so, as one proceeds to later time levels.

With regard to repeat reliability, the findings of the first report show a high sequential intercorrelation of scores secured from the same form at different time levels; a particularly noteworthy relationship (about .90) was found between third and sixth week scores for all forms. It would appear that the earlier readings may be taken as a reasonable approximation of the later ones.

Finally, no significant difference was discerned in either the single-stage reliability or repeat reliability of scores obtained from comparable forms administered under the "research" as against the "administrative" set.

TABLE II

Corrected Split-Half Reliabilities of
Eight Peer Nomination Forms at
Various Stages of Training

Week in Training

Forms	Orientation Week	Third Week	Sixth Week	Thirteenth Week
FO-RO	.94 96*	.97 92	.97 91	.97 91
FO-AU	.94 96	.97 96	.97 95	.95 91
IE-RO	.91 32	.96 29	.96 29	
IE-AU	.88 32	.89 32	.94 32	
LQ-RO	.93 32	.96 32	.96 31	
LQ-AU	.94 32	.97 32	.98 32	
OC-RO	.93 32	.98 31	.99 31	
OC-AU	.89 32	.97 32	.98 31	

*The number below each coefficient indicates
the N upon which it is based.

IX. Determination of Validity

Before reporting on the findings yielded by this phase of investigation, it is well to briefly consider some of the difficulties posed. Essentially, these devolve about the source and validity of the available criteria themselves.

First and foremost, we may ask what it is that our peer rating technique should give us by way of meaningful information? While not perhaps the complete answer, presumably we desire an adjunct to our other measures in predicting some future performance. Given this adjunct, we may predict more efficiently and, perhaps, screen early in training. But the future performance may be, as here, a two-stage affair, at the very least. All of which is by way of suggesting that we are concerned with both performance in OCS training and performance after OCS training—and that the behavior which is demanded and valued at these two levels may be quite disparate.

In this study we have used four basic peer nomination forms; each is designed to focus attention on some segment of observed or secondarily extrapolated behavior which has a bearing on one or both criterion levels. The "future officer" (FO) form is designed to provide prediction of long-range performance with the assumption that the pool of raters will integrate impressions so as to weight a variety of currently observed characteristics in generating a judgment. The other forms are more proximal in time and more specific: the "leadership qualities" (LQ) form strikes at a set of interpersonal behaviors which may have relevance to first level criteria, but are more likely to have relevance to second level performance as an officer; the "interest and enthusiasm" (IE) form is considered two-pronged in that it has applicability at both criterion levels; and, the "success in OCS" (OC) form is quite openly aimed at first level predictions, without

excluding its possibilities at the later levels. None of these expectations must necessarily hold; this is to be determined.

The matter of time appears to be of singular import. Depending upon which of these forms one considers, there is a difference in the optimum point at which a reading might be taken. Thus, by way of example, the OC form has less and less utility, as regards validity against final OCS academic average, the later in training one secures a reading. This follows from the likelihood that this form will have a progressively greater academic performance loading with time. Grades themselves would very likely do as well. Therefore, the maximum worth of the OC form, for first level prediction and subsequent screening, lies in its earliest possible administration, before raters have had an abundant input of academic performance data. This is predicated, however, on the assumption that some significant predictability is available at an early stage, e.g., orientation week.

With regard to other forms, like leadership qualities (LQ), we may be misled should we focus sole attention on its prediction of this same criterion, i.e., final OCS academic average. Indeed, it may be suggested that if this form is to do its job in tapping relevant interpersonal behaviors it ought to be minimally correlated with academic performance. Furthermore, it remains to be seen whether an early reading of this measure is necessarily the best.

So far, we have oriented our discussion about academic performance as a first stage criterion. There are two others, however, which may be utilized; these are final OCS military aptitude grade and the traditional pass-fail criterion. We have, in fact, studied prediction of all three of these criteria. It is presumed that the military aptitude criterion--based upon ratings assigned by Naval Officers in charge of

performance on the drill field, at inspection, and so forth--is more likely to approximate the second stage criterion than is academic average. Since the pass-fail criterion embodies both academic and strictly military considerations, it reflects a composite of the differential emphasis of these two criteria, with an evident loading in the academic direction.

At this point, then, it will not be possible to make absolute statements about the validity or utility of the various forms. Bound as we are to first stage criteria, we cannot dismiss any form as "invalid" without a consideration of its validity against a second stage, i.e., fleet performance, criterion. The results to be discussed, therefore, are not final but, of necessity, tentative. Further work with post-training criteria should provide a fuller picture.

X. Results and Discussion

Table III centers upon prediction of the pass-fail criterion. Mean peer nomination scores, on the various forms and sets, have been calculated from three stages for those subjects who were defined as "failures." Characterization of an individual as a "failure" is gross, at best; it is not always possible to ascertain the unique motivational or situational factors involved. Thus, we have arbitrarily considered those people "failures" who were involuntarily disenrolled from OCS by board action. This criterion excludes, therefore, those few individuals who voluntarily withdrew or who were dropped for medical reasons.

In viewing Table III, it is important to recall that the peer nomination scores are based on a mean of 50 and an approximate standard deviation of 10. Thus, the lower the mean score for failing subjects, the more effective is the prediction of failure.

It will be seen that the N's involved are quite small, particularly for the three secondary forms. Moreover, since initial attrition occurs

TABLE III

Mean Scores Obtained by Failing Subjects on
Eight Peer Nomination Forms at
Various Stages of Training

Week in Training

Forms and Sets	Orientation Week	Third Week	Sixth Week
FO-RO	47/22*	37/22	34/15
FO-AU	48/30	42/30	40/22
IE-RO	52/6	42/6	42/4
IE-AU	50/13	48/13	47/10
OC-RO	42/6	26/6	14/5
OC-AU	46/12	31/12	23/8
LQ-RO	47/10	39/10	36/6
LQ-AU	48/5	46/5	48/4

*The number after each mean indicates
the N upon which it is based.

TABLE IIIa

Summary of Analysis of Variance for Table III with Assumption of One Case Per Cell

Source	Sum of Squares	df	Mean Square	F	
(1) Form	938	3	312.67	7.27 *	[From (4)]
(2) Time	613	2	306.50	7.93 *	[From (4)&(5)]
(3) Set	145	1	145.00	5.69 NS	[From (5)]
(4) F x T	258	6	43.00	23.50 **	[From (7)]
(5) T x S	51	2	25.50	13.93 **	"
(6) F x S	14	3	4.67	2.55 NS	"
(7) Residual	11	6	1.83		
TOTAL	2030	23			

* 5% Level
** 1% Level
NS Not Significant

after the end of the fourth week, the N's for orientation week and the third week are identical, with a drop in N at the sixth week.

To gain an overview of the relationships at play in Table III, an analysis of variance was completed and is summarized in Table IIIa. The limiting feature of this analysis was the assumption of one case per cell, necessitated in part by the small and variant N's involved. Such an analysis diminishes degrees of freedom considerably and hence reduces power. On the other hand, more marked differences are demanded to yield significance; thus, F's which are significant may be considered to be so under a handicap. Beyond this, it is also true that the intercorrelation of FO with the other forms operates as still another limiting factor. The analysis, therefore, is highly conservative in the direction of rendering non-significant findings.

Study of Table IIIa reveals that the independent effects of form and time of administration are significant; this is not the case, however, for set. In this connection, though, the interactions of form x time and set x time are significant, this latter fact indicating that set does provide an effect over time. Considering the limitations noted above, the set should not be totally dismissed in the prediction of this criterion.

Two general trends are worth noting here: prediction tends to improve for all forms with a later time of administration--particularly from the orientation week to third week levels; and, the OC form stands out as a consistently better predictor. In light of the small N's, however, no attempt has been made to test the statistical significance of mean differences within this Table III except for FO; in this instance, no significance is found between FO-RO and FO-AU at any level, but third and sixth week scores are significantly lower (i.e., better) than orientation week ratings, while not differing from one another significantly

The prediction of a related criterion, i.e., final OCS academic average, is considered in Table IV. As has been foreseen in the foregoing section, a generalized increase in the magnitude of correlation between forms and the academic criterion is to be found over time. Furthermore, while varying considerably in magnitude, the coefficients are significant, in the main.

For the purposes of testing the differential effects of the variables involved, the coefficients for the first three columns (thus omitting FO-RO and FO-AU for the thirteenth week) were all transformed to Fisher's z and subjected to analysis of variance. Once having normalized them in this fashion, one may treat coefficients as any other numbers. This does, of course, obscure the N's involved in their determination and leads to the limitation of degrees of freedom and analytic power. The consequences of this conservative approach have been considered above.

The F's in Table IVa parallel those determined in connection with the pass-fail criterion (cf. Table IIIa). Form and time yield significant independent effects; set does not. With regard to interaction effects, once again the form x time interaction is a significant one. In contrast to the previous table cited, it is not time x set interaction which is significant, but form x set. The genesis of this may be sought through study of Table IV.

Speaking to this point, one of the features of this basic table is the pattern of differential validities to be found for the two sets within the IE and LQ forms. In the former case, the "administrative" set yields higher r's than does the "research" set (IE); in the latter case the inverse pattern is found (LQ). For both the IE form and the LQ form these differences are consistent and significant. One may conjecture about these IE and LQ patterns since--taking account of the similarity of

TABLE IV

Validity Coefficients Against Final OCS Academic Average for
Eight Peer Nomination Forms at
Various Stages of Training

Week in Training

Forms and Sets	N	Orientation Week	Third Week	Sixth Week	Thirteenth Week
FO-RO	349	.15**	.46**	.51**	.47**
FO-AU	320	.12*	.39**	.40**	.41**
IE-RO	119	.05	.22*	.16	
IE-AU	116	.29**	.41**	.30**	
OC-RO	112	.31**	.70**	.73**	
OC-AU	82	.32**	.74**	.83**	
LQ-RO	118	.29**	.45**	.54**	
LQ-AU	122	.10	.22*	.25**	

*5% Level
**1% Level

TABLE IVa

Summary of Analysis of Variance for Table IV:
Following z Transformation of Validity Coefficients /
Against Final Academic Average

Source	Sum of Squares	df	Mean Square	F	
(1) Form	9678	3	3226	6.16 *	From (4)&(6)
(2) Time	5662	2	2831	6.31 *	From (4)
(3) Set	3	1	.3	----- NS	From (6)
(4) F x T	2692	6	449	10.20 **	From (7)
(5) T x S	8	2	4	----- NS	"
(6) F x S	2021	3	674	15.32 **	"
(7) Residual	264	6	44		
TOTAL	20328	23			

/ The decimal point for the z's
has been disregarded in this
analysis.

* 5% Level
** 1% Level
NS Not Significant

sets for FO and OC--these are the evident source of the significant

form x set interaction just noted. For the moment, it may be hypothesized

that in both instances the administrative set yields all that one might

expect of the form. Thus, a "good" LQ form presumably should have a low

loading with academic performance, and, similarly, a "good" IE form--if

it taps motivation--should have a somewhat higher loading with academic

performance. This is the picture we find for the forms administered

under the AU set. It is not necessarily the sole explanation, however.

One sign which to some degree contraindicates the above hypothesis,

is the high correspondence between OC-RO and OC-AU validity coefficients

over time. The form yields a high validity under both sets. It would

appear, then, that the set differences are unique to form. More considera-

tion of this point will be undertaken below. At the moment, however, it

may be said that the OC form--taken over time--affords better prediction

than any of the other forms; this superiority is significant at the 1%

level. Further, it accords well with the findings of the preceding

analysis. It may be noted, too, that third and sixth week predictions,

by form, were once again generally comparable and significantly different

from parallel orientation week predictions.

Following on the validity coefficient analysis with final academic

average as a criterion, Table V presents validity coefficients using

military aptitude grade as a criterion. It will be noted that all of

these are significant beyond the 1% level, which says effectively that

peers, in their evaluations, respond positively to qualities which are

seen by military instructors as important--and do so very early in train-

ing, i.e., orientation week. Previous work in this vein (4) has led

to the belief that some general set of interpersonal characteristics are

involved which both peers and superiors acknowledge as desirable.

TABLE V

Validity Coefficients Against Final OCS Military Aptitude Grade for
Eight Peer Nomination Forms at
Various Stages of Training

Week in Training

Forms and Sets	N	Orientation Week	Third Week	Sixth Week	Thirteenth Week
FO-RO	349	.37	.47	.51	.49
FO-AU	320	.29	.45	.43	.43
IE-RO	119	.37	.41	.38	
IE-AU	116	.44	.49	.41	
OC-RO	112	.34	.31	.29	
OC-AU	82	.31	.47	.42	
LE-RO	118	.41	.52	.57	
LE-AU	122	.41	.42	.45	

Note: All of the above coefficients are
significant beyond the 1% level.

TABLE Va

Summary of Analysis of Variance for Table V:
Following z Transformation of Validity Coefficients[/]
Against Military Aptitude Grade

Source	Sum of Squares	df	Mean Square	F	
(1) Form	524	3	174.7	5.02 *	From (7)
(2) Time	396	2	192.0	5.69 *	"
(3) Set	0	1	0	---- NS	"
(4) F x T	21	6	36.2	---- NS	"
(5) T x S	31	2	15.5	---- NS	"
(6) F x S	471	3	157.0	4.51 NS	"
(7) Residual	209	6	34.3		
TOTAL	1848	23			

[/] The decimal point for the z's
has been disregarded in this
analysis.

* 5% Level
NS Not Significant

In accordance with the analytic procedure for Table IV, the coefficients here were transformed to z's and subjected to an analysis of variance, reported in Table Va. Study of this reveals significant independent effects traceable to form and time. Neither set nor any of the interaction effects are significant.

Returning now to Table V, it will be noted that the orientation week reading is, in general, less predictable than the third week reading or the sixth week reading; as before, these latter two readings are not significantly different from one another. In terms of comparison of forms, LQ is a significantly better overall predictor of this criterion than is OC.

From a somewhat different viewpoint, still another question of validity concerns the relationship of peer nomination scores to basic intellectual factors. Early in training, the subjects of our study routinely took the Officer Classification Battery (OCB) which yields five scores; the two which most concern us here are Verbal and Math. For this sample, they have r's with final academic average which are .40 and .58 respectively.

In Table VI, r's are given between the Verbal and Math scales and the peer nomination scores obtained from forms administered under the two sets at different time levels. One is immediately struck by the paucity of significant relationships between these two intellectual measures and the orientation week peer nominations. It is noteworthy, too, that a progressive increase in significant r's is seen as one proceeds to the next time levels. Such a finding is not surprising in view of previous evidence and discussion regarding the contaminating influence on peer nominations of academic performance data.

TABLE VI

Relationship of Eight Peer Nomination Forms
Obtained at Various Stages of Training to
Verbal and Math OCB Scores

VERBAL

Week in Training

Forms and Sets	N	Orientation Week	Third Week	Sixth Week	Thirteenth Week
FO-RO	349	-.01	.18**	.18**	.13**
FO-AU	320	.06	.24**	.23**	.19**
IE-RO	119	-.09	-.11	-.20*	
IE-AU	116	.20*	.26**	.17	
OC-RO	112	.15	.41**	.38**	
OC-AU	82	.23*	.44**	.43**	
LQ-RO	118	.08	.17	.26**	
LQ-AU	122	-.09	.05	.06	

MATH

Week in Training

Forms and Sets	N	Orientation Week	Third Week	Sixth Week	Thirteenth Week
FO-RO	349	-.10	.17**	.23**	.23**
FO-AU	320	-.01	.21**	.24**	.22**
IE-RO	119	-.03	.11	.07	
IE-AU	116	.11	.16	.11	
OC-RO	112	.10	.41**	.47**	
OC-AU	82	.05	.44**	.52**	
LQ-RO	118	.00	.13	.19*	
LQ-AU	122	-.01	.09	.14	

* 5% Level
** 1% Level

Most illuminating, among the multifarious relationships manifested here, is the fact that neither FO nor LQ--the two forms seen as more long-range predictors--reflect nearly so high a relationship with either scale as does OC, the more limited, in-training predictor. Furthermore, it is important to call attention to the fact that OC, which predicts the final academic criterion significantly at the orientation week level (cf. Table IV), does not bear a significant relationship to the Math scale at this level and, while significant in relationship to the Verbal scale, under the AU set, it is not near the magnitude it attains by the sixth week. Evidently, then, certain of the non-intellective, personal factors associated with academic performance are being measured by the OC form even at this level.

Returning to the discussion undertaken in connection with Table IV, we may now further consider the discrepancy between the prediction of the academic criterion yielded by IE-RO as opposed to IE-AU. Table VI provides some illumination of the likely factors underlying this. It will be noted that IE-RO manifests a progressively increasing negative relationship with the Verbal scale of OCS; this pattern is inverse for IE-AU, at two time levels. Since no comparable differences are to be found in the respective relationships of these sets of IE with the Math scale, it would seem that verbal skills largely account for the differences in prediction of the academic criterion afforded by the sets. Thus, it follows that the less verbally facile individuals--if we may assume a behavioral correlate of low Verbal scores--are being perceived as more motivated, i.e., "interested and enthusiastic." It might be said, therefore, that they are thus the recipients of a "boost" from their peers. Yet, this is what one would more likely expect under an "administrative" set where nominations may

have real, or presumed, impact on the nominee's status. The fact
that, to the contrary, this occurs under the "research" set could lead
to the view that the AU set is to be preferred for prediction when
utilizing the IE form. There are those who could argue, however, that
the negative relationship between IE-RO and the Verbal scale implies
a "purer" measure of motivation than that obtained where a positive
relationship is found, as in the case of IE-AU. This tangential issue
remains to be resolved.

XI. Conclusions

Taken together, the findings obtained for the prediction of
in-training criteria lead to the central conclusion that peer nomina-
tions do discriminate among characteristics and do yield varying valid-
ities. Different forms, therefore, may be considered to provide unique
views of the individual. As regards any substantial differences attrib-
utable to set, the evidence is essentially non-confirming.

For the prediction of academic performance, nominations on "success
in OCS" at the orientation week level are significant. This is certainly
worth noting--particularly since such scores are devoid of classroom
impressions and have a low relationship to the Verbal and Math factors.
There is reason to believe that the "leadership qualities" form, too,
could be profitably utilized early in training in order to obtain a
view of the individual which is relatively free of academic contamination.
The same possibility exists for the "future officer" form.

In terms of the time dimension, the available evidence indicates a
clear increase in the correlation of peer nominations with academic per-
formance from stage to stage. Related to this point, however, is the
consideration that third week ratings yield a reasonable approximation
to sixth week ratings. To effectively minimize contamination effects,

then, it would seen desirable to use peer nominations at the third week level and perhaps earlier.

Although these findings do illuminate paths of application, they are tentative. Without data bearing upon post-training performance, any broad generalization from them must be approached with caution. This is not to be considered the last word. With the procurement of more ultimate criteria these findings should be set on firmer ground.

Bibliography

1. Anderhalter, O. F., Wilkins, W. L., and Rigby, M. K. Peer Ratings. Technical Report No. 2. St. Louis: St. Louis University, 30 November 1952.

2. Hollander, E. P. Buddy Ratings: Military Research and Industrial Implications. Personnel Psychology, 1954, 7. 385-393.

3. Hollander, E. P. Conditions Affecting the Military Utilization of Peer Ratings: The Newport Study. I. Reliability. Navy Technical Report 1-56. Pittsburgh: Psychological Laboratories, Carnegie Institute of Technology, January, 1956.

4. Hollander, E. P. Peer Nominations on Leadership as a Predictor of the Pass-Fail Criterion in Naval Air Training. Journal of Applied Psychology, 1954, 38, 150-153.

5. Hollander, E. P. Studies of Leadership Among Naval Aviation Cadets. Journal of Aviation Medicine, 1954, 25, 164-170, 200.

6. Jenkins, J. G. The Nominating Technique as a Method of Evaluating Air Group Morale. Journal of Aviation Medicine, 1948, 19, 12-19.

7. McClure, G. E., Tupes, E. C., and Dailey, J. T. Research on Criteria of Officer Effectiveness. Research Bulletin 51-8. San Antonio: Human Resources Research Center, Lackland Air Force Base, May, 1951.

8. Ricciuti, Henry N. and French, J. W. Development of Personality Tests for Naval Officer Selection: I. Analysis of U. S. Naval Academy Criterion of Aptitude for Service. Technical Report No. 1, Princeton, N. J.: Educational Testing Service, March, 1951.

9. Suci, G. J., Vallance, T. R., and Glickman, A. S. An analysis of Peer Ratings: I. The Assessment of Reliability of Several Question Forms and Techniques Used at the Naval Officer Candidate School. Technical Bulletin 54-9. Washington, D. C.: Bureau of Naval Personnel, June, 1954.

10. Vaughn, C. L. The Nominating Technique. In New Methods in Applied Psychology. College Park: University of Maryland, 1947, 22-25.

11. Webb, W. B. and Hollander, E. P. Comparison of Three Morale Measures: A Survey, Pooled Group Judgments, and Self Evaluation. Journal of Applied Psychology, 1956, 40, 17-20.

12. Wherry, R. J. and Fryer, D. H. Buddy Ratings: Popularity Contest or Leadership Criterion? Personnel Psychology, 1949, 2, 147-159.

13. Williams, S. B. and Leavitt, H. J. Group Opinion as a Predictor of Military Leadership. Journal of Consulting Psychology, 1947, XI, 283-291

14. Follow-up Study of Officer Performance of West Point Graduates. PRS Report #767, Washington, D. C.: Personnel Research Section, AGO, 1948.

15. Follow-up Validation of Predictor Instruments for West Point Classes of 1944, 1945, and 1946 Against 1948 Ratings on DA AGO Form 67-1. PRS Report #811, Washington, D. C.: Personnel Research Section, AGO, 1949.

Participating Project Personnel—Carnegie Institute of Technology

Principal Investigator: E. P. Hollander

Graduate Assistants: William H. Meanor
Brian J. O'Brien

Research Assistants: Marilyn E. Adler
Joyce Gunia

APPENDIX A—FORM FO-RO

U. S. NAVAL SCHOOL, OFFICER CANDIDATE
NEWPORT, RHODE ISLAND

You have been together with the men in this room since you entered OCS.
From this contact, you will have formed certain impressions of them regarding
their future success as Naval Officers.

Considering these impressions, and carefully weighing the qualities
required in a successful Naval Officer, you are to select the five members of
your section whom you consider to have the highest promise as Naval Officers,
and the five members of your section whom you consider to have the lowest
promise as Naval Officers.

THE RESULTS OF THESE RATINGS ARE TO BE USED FOR RESEARCH PURPOSES ONLY
AND WILL NOT AFFECT YOUR NAVY CAREER.

Specifically, you are to perform these exact operations:

1. Consult the section roster which has been provided you and
draw a line through your own name.

2. Study the remaining names on the roster and select the
individual with the highest promise of success as a Naval Officer.
Enter this name in the space labeled H-1 below and then draw a line
through that name on the roster.

3. Study the roster again and then select the individual with the
lowest promise. Enter this name in the space labeled L-1 below and
then draw a line through that name on the roster.

4. Continue the study of this roster, alternately selecting
individuals with the highest promise and the lowest promise, until
you have entered ten names. Draw a line through each name on the
roster as you write it in the proper place here.

HIGHEST PROMISE _____ H-1

_____ H-2

_____ H-3

_____ H-4

_____ H-5

_____ L-5

_____ L-4

_____ L-3

_____ L-2

LOWEST PROMISE _____ L-1